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THESIS

EVOLUTION OF THE
SHIPBUILDING ESCALATION CLAUSE

by

Joseph Matthew Jones

June 1982

Thesis Advisors: J. W. Creighton
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and the effects of the current clause.

The analysis emphasizes the change in the Navy's approach to escalation coverage that has occurred since 1962. It was concluded; that the ship acquisition environment has influenced the development of the current escalation clause, that escalation coverage has become progressively more comprehensive and that the use of the current escalation clause does have some adverse effect on the shipbuilding process.

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Evolution of the Shipbuilding Escalation Clause

by

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Commander, United States Navy
B.S., Virginia Polytechnic Institute, 1968

Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

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TABLE OF CONTENTS

I. INTRODUCTION AND BACKGROUND ---------- 7

A. BACKGROUND ---------- 7

B. OBJECTIVE/SCOPE ---------- 12

C. METHODOLOGY ---------- 13

D. THESIS ORGANIZATION ---------- 14

II. SHIPBUILDING ESCALATION CLAUSES ---------- 16

A. INTRODUCTION ---------- 16

B. PURPOSE OF CLAUSES ---------- 16

C. OPERATION OF CLAUSES ---------- 18

D. HISTORICAL PERSPECTIVE ---------- 20

E. SUMMARY ---------- 24

III. RECENT SHIPBUILDING ESCALATION CLAUSES ---------- 25

A. INTRODUCTION ---------- 25

B. FIXED CURVE CLAUSE (1962) ---------- 25

C. ACTUAL COST CLAUSE (1975) ---------- 29

D. CURRENT CLAUSE ---------- 35

E. SUMMARY ---------- 36

IV. ANALYSIS OF CURRENT COVERAGE ---------- 37

A. INTRODUCTION ---------- 37

B. TRANSITION FROM THE 1962 TO THE 1975 CLAUSE ---------- 37

C. SPECIFIC UNDESIREABLE EFFECTS ---------- 39

D. DESIREABLE ASPECTS ---------- 45

E. SUMMARY ---------- 46

V. CONCLUSIONS AND RECOMMENDATIONS ---------- 47

A. INTRODUCTION ---------- 47

B. CONCLUSIONS ---------- 47

C. RECOMMENDATIONS ---------- 51

APPENDIX A: GUIDE FOR FIXED PRICE INCENTIVE CONTRACTING ---------- 52

APPENDIX B: AOR-7 CLAUSE (1962) ---------- 53

APPENDIX C: SAMPLE OF COMPUTATION
OF LABOR ESCALATION UNDER 1962 CLAUSE ---------------- 57
APPENDIX D: FFG-7 CLAUSE (1975) --------------------- 59
APPENDIX E: 1975 CLAUSE
FORMULA FOR PAYMENT OF ESCALATION -------------------- 63
APPENDIX F: SSN 688 CLASS CLAUSE (CURRENT) ---------- 65
LIST OF REFERENCES ---------------------------------- 72
INITIAL DISTRIBUTION LIST --------------------------- 73

I. INTRODUCTION AND BACKGROUND

A. BACKGROUND

Discussion with officials involved in the United States Navy (Navy) ship acquisition process at the systems command level disclosed concern over current contract escalation clauses. The concern was due specifically to the extent of coverage and with the complexity of the clause. It was suggested, by systems command personnel, that an objective assessment of the current escalation coverage be performed.

The author's research indicated that the evolution of ship acquisition contractual arrangements and the clauses contained within have been influenced to a large degree by the environment involved. It became evident to the author during the research process that the three most influential factors within that environment are, the complex design and construction process, political forces and the requirement to build all ships in commercial shipyards.

The author's research indicated that construction of Navy ships is a long term undertaking which can take anywhere from three to seven years depending on the size of the ship and the complexity of design. The complexity involved becomes apparent when the requirement itself is examined. The ships in question must be able to accomodate some of the most sophisticated weapon systems developed to date. They must be able to operate for sustained periods of time under either conventional or nuclear power. The sheer size and operaitonal requirement for some ships provides some indication of the complexity entailed.

The modern aircraft carrier has to be able to operate at high speeds, launch and recover the most sophisticated combatant aircraft in existence and provide suitable living and working accomodations for up to six thousand people. Another example of size as an indication of the complexity of the requirement is the modern fleet ballistic missile submarines. These submarines are almost as long as two football fields, as wide as a city bus is long and are able to carry and launch 24 long range missiles that weigh up to 63 tons each.

The long term nature and complexity involved in shipbuilding are discussed because they are determinants of risk which directly influences contract type and contract provisions. Another input to the contract risk involved is the fact that ship design is by its very nature subject to continual change.

The author's research indicated that the acquisition of ships involves political ramifications because required funding has to come about as a result of congressional legislation. It was learned that the high cost of ships is reason for continuous debate and concern over methods of acquiring them and requires extensive justification on the part of the Navy. A review of the United States (U.S.) Congressional record indicated that the Congress as guardian of public funds is normally not in favor of open ended cost-type shipbuilding contracts. Another very important reason for political interest is the number of jobs that can be provided to a particular geographical area. A major shipbuilder in the U.S. can employ thousands of workers. This can afford shipbuilders a sound political base from which to influence Navy contracts. Other aspects of the political/congressional process that have a significant

impact on contractual arrangements with the shipbuilders are the socioeconomic requirements mandated by federal law. These requirements are very often implemented by means of Government contracts.

The initial research efforts found that the third factor that has influenced contractual arrangements is the lack of alternative construction facilities. Regarding the construction of Navy ships, the accepted practice is that it be performed in commercial shipyards. Because of this the Navy has allowed its inhouse capability to design and build ships to deteriorate causing the Government to have limited flexibility in cases where there are disagreements with shipbuilders over contract costs, delivery schedules, specifications or clauses. This situation can be a difficult one for the Navy especially when the goals and the requirements of the parties are considered. The author's research indicates that the Navy is constantly constrained by the urgency of acquiring ships to provide for the defense of the country. The major shipbuilders on the other hand are not so constrained and are concerned primarily with cash flow and profits.

Another difficult aspect of buying ships commercially is that the Navy is required to obligate shipbuilding funds appropriated by Congress in a timely fashion. Contractors knowing this, can stretch out negotiations in pursuit of higher prices and more favorable contract provisions. It is also important to note that the majority of the major shipbuilder's business is with the Navy because commercial ship construction has migrated to foreign yards. A situation has resulted where the Navy and the shipbuilders have little alternative but to deal with each other. It is the author's opinion that due to the urgency of the

requirement and the largeness of the business entities involved in shipbuilding the Navy is at a disadvantage in the acquisition process and must make contractual concessions to acquire ships.

This brief discussion of the important factors that influence the ship acquisition process is necessary prior to an evaluation of the use of a current contract provision such as the Escalation clause. As stated before the reason is that these factors influence the kind of contractual arrangement the Navy must enter into with private shipbuilders to acquire ships. The arrangement is the result of the contract type and the terms and conditions that make up the contract. Prior to a discussion of a particualr provision contained in shipbuilding contracts such as the escalation clause, it is also necessary to understand the type of contract in use today.

There are two basic contract types used for the acquisition of ships by the Navy. They are the fixed price type and the cost type. The major difference between these two types of contracts is the allocation of cost risk to the parties to the contract. The fixed price type of contract provides for the assumption of the majority of the cost risk by the contractor whereby the cost type contract allocates the assumption of the majority of the risk to the Government. A study prepared by the Assistant Secretary of the Navy [Ref. 1] indicates that most shipbuilders would favor a cost type contract when there is a high degree of risk involved.

There is some merit associated with this considering the risks associated with Navy shipbuilding due to length of construction, complexity of design which is subject to constant change and the existence of federally mandated

requirements. The Navy on the other hand has generally advocated the use of the fixed price type of contract to acquire ships. There is merit to this argument which emphasizes keeping costs down, providing incentive for effective management, incentivizing timely delivery and aiding in the process of budgeting and managing appropriated funds. Arguments for either position can be convincing and therein lies a problem of devising a contractual arrangement to accomodate the desires and needs of both the shipbuilder and the Navy. Interviews with Navy headquarters personnel indicated that ships acquired by the Navy are being built under a fixed price type contract. There are some ships, however, being built under cost type contracts. These are normally the first ship of a new class because it is considered more equitable for the shipbuilders given the complexities and unknowns affiliated with a new class of ships. This is significant in that it is an indication of a shift in thinking regarding the allocation of cost risk under Navy shipbuilding contracts. The cost type contract allows the shipbuilder to shift almost all the cost risk associated with ship construction to the Government. This kind of contracting is at the opposite end of the risk spectrum from the Firm Fixed Price (FFP) contract. It was determined through interviews with systems command personnel that at one time the FFP contract was considered the most effecient and effective way to buy ships.

Contracts used for the acquisition of ships other than the leadship of the class are of the fixed price type and are called Fixed Price Incentive Fee With Economic Price Adjustment contracts (FPI/Escalation). Appendix A was taken from the DOD Incentive Contracting Guide, [Ref. 2] and provides a brief discussion of this type contract. The development of this form of fixed price contracts is

significant because it has allowed the Navy to acquire ships and at the same time accomodate the demands of concerned Navy personnel, the congress and the shipbuilders.

The FPI/Escalation contract has allowed the Navy to satisfy elements within its organization that have shown extreme concern over the use of cost type contracts. The FPI/Escalation contract is also advantageous politically in that it keeps the Navy from having to tell the taxpayer and the Congress that very costly items are being bought from industry under cost type arrangements. This kind of contract is advantageous to shipbuilders because it shifts much of the cost risk associated with the length of construction and the complexity of design to the Government.

The significance of this contractual arrangement is that although it is of the fixed price variety it represents a substantial shift toward risk sharing features of a cost type arrangement. The specific features of this contractual arrangement are the escalation clause, the incentive sharing provisions and the ceiling price provision. These provisions have evolved in some cases to the point where the contract has literally become cost type in nature. It is necessary to have some understanding of contract type because the author's research indicates that it has had an influence on the development of the current escalation clause.

B. OBJECTIVE/SCOPE

It is the objective of this thesis to depict how and why the current method of escalation coverage has come about, why the clause is so complex, if the clause provides excessive coverage and if the clause is having an adverse

impact on the shipbuilding process. It is intended that an assessment of this type will allow those involved in the acquisition process an opportunity to make a determination of future action concerning shipbuilding contract escalation provisions.

The scope of the thesis will be to demonstrate the escalation clause in the ship acquisition environment, describe shipbuilding contracts and the evolution and provide an analysis of current escalation provisions. Particular emphasis is placed on the transition from a fixed expenditure phasing type escalation clause to an actual expenditure phasing type clause.

The paper is not an attempt to show that either the shipbuilder or the Navy is right or wrong regarding contractual arrangements and particularly the escalation clause. It is an attempt to provide the opportunity to look objectively at shipbuilding contract escalation coverage. In reviewing the current shipbuilding escalation provisions it is necessary to understand that it is the product of an ongoing process that has been in progress since the pre World War II period. The author has selected the period from 1962 until the present as the period of significance. It is also necessary to keep in mind that the current escalation provision is the result of the efforts of two very large and powerful entities, namely the United States Government (Government) and the corporate organizations that own the shipbuilder.

C. METHODOLOGY

The approach to the problem will be one utilizing content analysis, informal interviews, a literature search and personal experience. The interviews were conducted with

individuals at the Navy headquarters level and field activities who were knowledgeable in the Navy ship acquisition process. The individuals include those working with major ship acquisition programs, contracting personnel and Department of Defense (DOD) auditors. The author's experience includes assignments with two major shipbuilding acquisiton programs and with the claims group established by the Navy in 1976 to aid in settling major shipbuilding claims.

D. THESIS ORGANIZATION

The first chapter provides information concerning the environment that influences the acquisition process. It also provides some background information concerning the contractual arrangements with major shipbuilders. It is intended that the results of research in these two areas will provide the basis for determining how and why the current escalation clause has evolved to what it is today.

Chapter II will explain the purpose of escalation clauses. It will provide some understanding of the basic operation of escalation clauses used in contracts for Navy ships. Prior to going to Chapter III and reviewing developments in escalation coverage over the recent past (1962 - 1982) some historical background will be provided. This chapter is intended to help the reader understand how these clauses started,what their purpose is and how they operate.

Chapter III will provide an in depth review and comparison of the significant changes in escalation coverage over the past 20 years. It was during this period that a drastic change in the way the Navy provided escalation coverage came about, and that the concept of reimbursing the

contractor for almost all of the effects of inflation was to occur. It is intended that the research effort in this area will answer questions pertaining to the increase in complexity and the amount of coverage provided. The effort will also provide more of the answer to the question of how and why the current clause got to be as it is today.

Chapter IV will analyze the effects of the transition from the 1962 escalation clause to the 1975 clause. The analysis will determine the desireable and undesireable effects of the transition.

Chapter V will provide a summary and conclusion of the research and analysis. The author will provide recommendations concerning future shipbuilding contract escalation coverage.

II. SHIPBUILDING ESCALATION CLAUSES

A. INTRODUCTION

Prior to an analysis of the current shipbuilding escalation clause it is necessary to have a general understanding of the purpose of escalation clauses, how they operate and their historical development. The historical aspect of Chapter II will be up through the development of the Navy's 1975 Standard Escalation clause. Chapter III will analyze the developments in escalation coverage from 1962 through the present.

B. PURPOSE OF CLAUSES

The term "escalation" is used here to describe the post contract award cost increases incurred as a result of higher labor and material costs in the shipbuilding industry. Stated another way, the term is used to describe the impact of inflation on contract costs during the period of ship construction.

Escalation provisions are included in shipbuilding contracts for Navy ships to alleviate the effects of inflation on the contractor's labor and material costs. The Defense Acquisition Regulation (DAR) [Ref. 3], indicates that there may be Economic Price Adjustments to fixed-price type contracts, "when the contracting officer determines that price adjustment provisions are necessary...to protect the contractor and the Government against significant economic fluctuations in labor or material costs..."[Ref. 3]. The Navy currently uses a Cost Index Method of providing escalation coverage which, according to the DAR,

is "designed to minimize contingency pricing", and is recommended when:

1. There will be an extended period of performance with significant costs to be incurred beyond one year after commencement of contract perofrmance.
2. The contract amount subject to adjustment is substantial.
3. The economic variables for labor and material are determined to be too unstable to reflect a reasonable division of risk between the parties absent economic price adjustment provisions.[Ref. 3]

Escalation provisions are only applicable to fixed-price type contracts. Cost type contracts do not require escalation coverage due to the fact that the Government assumes the majority of the cost risk and is commmitted to reimbursing a contractor for all allowable and allocable costs. Support for the current use of the Cost Index Method of economic price adjustment is that it is thought to minimize contingency pricing by requiring shipbuilders to submit their price proposals in Base Month dollars. Under this kind of clause, payments of the basic contract cost (basic Costs) are made periodically, are based on physical progress with an adjustable billing base, and are calculated in Base Month dollars. The payment of escalation is calculated separately on the basis of an agreed to index and on the actual incurred costs.

The intent of the escalation provisions currently used in Navy shipbuilding contracts is to consider the long term aspects and complexity involved in the process, to remain within the DAR provisions, but accomodate the shipbuilding process and provide an arrangement whereby the shipbuilder is approximately compensated for inflationary effects. The author's research indicates that the mechanics of this kind of clause are intended to recognize the fact that the shipbuilder maintains some control over the degree to which his costs are affected by inflation.

C. OPERATION OF CLAUSES

The operation of the Cost Index Method of economic price adjustment currently used in Navy shipbuilding contracts requires a labor and material index. The material index used is termed the Material Index for Steel Vessel Contracts. It is made up of the elementary Bureau of Labor Statistics material indexes for Iron and Steel, General Purpose Machinery and Electrical Machinery and Equipment [Ref. 4]. This material index has been criticized because it does not include inputs for many of the other materials that go into the construction of a ship. The author's research effort indicated that the advantage of this index is its simplicity in that the use of a few elements that are very familiar to the shipbuilding industry provides for increased predictability which is of primary importance in the pricing of long term shipbuilding contracts. Increased predictability is significant in that shipbuilders generally approach pricing by fully forward pricing the anticipated contract and subtracting out an estimate of escalation to be recovered under the escalation clause. The more predictable the estimate of escalation the less opportunity there is for overpricing or underpricing the contract.

The labor index used to facilitate current shipbuilding escalation provisions is the Index of Average Hourly Earnings for Steel Vessel Contracts. This index is claculated for the Navy by the Bureau of Labor Statistics and published monthly. It is based on labor data inputs of straight-time hourly wages from 17 private shipyards. This input is voluntarily submitted and does not include shift differentials, overtime premiums, or holiday premiums. First-line supervisory wages are reported as direct labor.

The escalation payment calculation (greatly simplified) for a monthly period under current Navy shipbuilding contract provisions is as shown in Exhibit II-1. It was taken from NAVSEA data.

$$\begin{matrix}\text{MONTHLY}\\ \text{ESCALATION}\\ \text{PAYMENT}\end{matrix} = \begin{matrix}\text{CHANGE}\\ \text{IN THE}\\ \text{INDEX}\end{matrix} \times \begin{matrix}\text{CONTRACTOR'S}\\ \text{ACTUAL INCURED}\\ \text{COST}\end{matrix}$$

Exhibit II-1

SIMPLIFIED ESCALATION CALCULATION

There can be some variation in this calculation depending on the desire to arrive initially at either the escalation costs or the base contract costs.

The escalation calculation is intended to be carried out in three operations, treating direct labor costs, material costs and indirect costs separately due to differences in applicalble index and/or fraction of costs covered by the escalation provisions. Monthly escalation payments, calculated as noted, are paid throughout the life of the contract subject to delivery constrained limiting dates and to limiting dollar amounts. Escalation payments are not made on incurred costs which exceed the contract ceiling price identified in the incentive sharing agreement. The current escalation provisions provide for frequent reimbursement of cost increases incurred as long as they are within the agreed upon dollar limits. The provisions also provide for payment of escalation outside the contract incentive pricing arrangement. By means of the Payments clause, payment of the basic contract price is made on a percentage of completion basis.

In summary the escalation clause is to protect the Government and shipbuilder against economic fluctuations and to eliminate contingency pricing. The operation of current clauses are based on labor and material indices derived from BLS data applied to shipbuilders costs to determine his increase or decrease in expected costs due to inflation. This is an overview of current escalation provisions. A more in depth analysis will be provided in chapter II under the heading of the 1975 standard clause.

D. HISTORICAL PERSPECTIVE

The escalation clause that is currently being used in major Navy shipbuilding contracts has its basis in the fact that escalation payments are computed using the contractor's actual incurred costs. It is the result of a clause that was devised in 1975 by the Navy which has undergone constant revision. The author's research indicates that this revision has been as a result of the demands of shipbuilders, and in keeping with the Navy's apparent policy of in fact relieving the shipbuilders of as much of the business risk of inflation during ship construction as is possible.

There is one other primary shipbuilding contract escalation clause that has been used by the Navy during the period of the last 20 years which is the Fixed Curve Clause devised in 1962. The operation of this clause is based on the premise of a fixed baseline in terms of cost subject to escalation and the time phasing of those costs.

It is interesting to note that the Fixed Curve clause was developed during a period when the Navy was buying ships on a Fixed-Price basis. After the Navy determined that it was more prudent to institute a new concept of contracting

for ships in the form of Fixed Price Incentive (FPI) contracts, it became necessary to eventually modify the 1962 escalation clause. FPI contracting for ship construction came into being in the 1960s and was viewed as a less rigid form with a shifting of the assumption of some cost risk from the shipbuilder to the Government. The Fixed Curve escalation clause (1962) continued to be used in FPI contracts until 1975 when the Actual Cost clause (1975) was developed. This clause was definitely less rigid than the 1962 clause and very much in keeping with the shifting of risk concept embodied in the FPI contract. Research indicates that this occurred as a result of factors such as product complexity and business pressure.

A literature search conducted by the author revealed that escalation provisions currently used in shipbuilding contracts are a by-product of certain types of price redetermination provisions that were used prior to World War II. "Price redetermination" provisions were normally used in contracts where the Government might have reason to think that the contractor's proposed price was unreasonably high and wanted to make provision for downward repricing based on contractor submitted cost data for partial completion of the contract.

It was during the 1939-1941 time frame that the Navy began using escalation clauses in all of its contracts to deal with the increasing problem of inflation. The initial kind was a labor and material index clause. This type of clause provided for a percentage of changes in specified labor and material indices to be applied to a contractor's actual expenditures. This approach to escalation recovery is conceptually very similar to current shipbuilding escalation provisions whereby recovery is based on actual

incurred costs. The literature on this subject indicates that there was concern over the use of the actual expenditure basis of escalation recovery in that it was allowing an increase of costs on an increase already contained in the contractor's actual expenditures.

After World War II the Navy devised two escalation clauses in an attempt to accomodate contractor's demands for protection against rising costs. One clause was for labor, and upon completion of the contract provided for a one time escalation of direct labor, based on agreed estimates of average hourly wage rates and total hours of labor. The other clause dealt with material escalation costs in the same manner, on the basis of agreed to estimates of quantities and prices of raw materials. In both clauses the price adjustment was constrained by a fixed dollar ceiling. These clauses were eventually modified to provide for downward as well as upward price adjustment which is still a viable concept in current shipbuilding escalation provisions.

In 1956 the Navy began using a somewhat different approach to escalation coverage in shipbuilding contracts. A new clause was devised which provided for a dollar for dollar reimbursement on subcontracts and a material index for use in escalation recovery on raw materials cost. A regional labor index was used in determining escalation recovery on direct and indirect costs. In 1959 this clause was revised to use a material index developed by the Navy and the Maritime Administration for all escalation recovery on all material costs, eliminating the pass thru reimbursement type coverage for subcontract costs.

In 1962, a standard shipbuilding contract escalation clause was devised by the Navy. The regional labor index

used in the 1959 clause was replaced with a national labor index that was originally based on the average straight time hourly earnings of twenty-one selected shipyards. The material index remained the same as that used in the 1959 clause. The last major conceptual change in shipbuilding escalation clauses was in 1975 when the Navy developed the Actual Cost clause. To date, the significant changes regarding the use of this clause have been in the area of using separate indices for escalation coverage of certain costs, direct pass through escalation coverage for government caused increases, and improved escalation coverage past the contract delivery date until the actual delivery date.

It is interesting to note that the concept of escalation recovery in the form of direct pass throughs, appears to have some precedent in the early years of escalation clause development. The author's literature search indicates that it was referred to as automatic coverage by the Government, for Government actions that caused labor cost increases that in turn resulted in contract cost increases. This kind of coverage was a result of actions taken by the Office of Price Administration regarding the establishment of maximum prices and actions taken by the War Labor Board that caused increases in labor costs. In July of 1944 a clause commonly referred to as the "Forrestall" clause was incorporated into Navy contracts to eliminate some of the risk associated with U.S. Government actions that caused price increases. Under this clause the contractor had to warrant that its contract price did not contain any contingency allowances for wage and salary increases or adjustments in other terms and conditions of employment. The clause also said that in the case where the contractor was ordered by a "duly authorized agency of the federal government" [Ref. 5] to make such

changes in its wages, salaries, or other terms and conditions of employmnent as would substantially effect the cost of performing the contract, the contract price would be adjusted by mutual agreement.

E. SUMMARY

In summary, it is helpful to understand the apparent origins of some of the current concepts of escalation recovery that are in operation today when trying to evaluate if their current use is in fact appropriate. The next chapter will be an analysis of recent escalation coverage used in shipbuilding contracts. It will look at only two clauses and will cover the past 20 years of experience.

III. RECENT SHIPBUILDING ESCALATION CLAUSES

A. INTRODUCTION

This chapter will provide an analysis of the Navy's shipbuilding escalation coverage from 1962 through the present. There will be two specific clauses involved namely the Fixed Curve clause (1962) and the Actual Cost clause (1975). The change from the 1962 clause to the 1975 clause marks, in the author's opinion, a major shift in the philosophy concerning escalation coverage. The analysis will aid in understanding why the Navy uses the current form of coverage. It will also aid in understanding the kind and extent of coverage in effect today to provide the basis for an analysis of the possibility of excess coverage. This chapter will also provide the basis for an analysis of the complexity and adverse impact resulting from the use of the current clause.

B. FIXED CURVE CLAUSE (1962)

1. Background

In 1962 the Department of Defense encouraged the use of incentive contracts. Figures taken from D.F. Pace's text [Ref. 6] for 1960 indicate that 13.1% of all the Navy's contracting was in the form of Fixed Price Incentive (FPI) contracts. The remaining 86.9 % was in the following contract form:

Firm fixed price	31.9%
Fixed price redeterminable	6.7%
Fixed price escalation	18.6%
Cost reimbursement type contracts	29.7%

During this period it appears from the statistics that the Navy was frequently using a fixed-price contracting mode.

In the author's opinion the times were more conducive then than today for the use of fixed-price contracts in the acquisition of ships. There are two major reasons for this. The first is the fact that in the past, some ships for the Navy were being constructed in Government yards, offering an alternative to use of private shipbuilders. The second is that most shipyards had not yet become owned by large corporations that would later prove to have a strong influence of U.S. Government contract terms and conditions. The author's research indicated another factor that should be noted and that is that the economy was not nearly so inflationary as it was to become in the 1970s.

In 1962 the Navy developed an escalation clause for use in shipbuilding contracts commonly referred to as either the 1962 Standard clause or the Fixed Curve clause. This clause was developed to provide approximate protection to both the Government and shipbuilder against the fluctuations of labor and material costs that might occur between contract bid and delivery, and were outside the control of the contractor. The clause evolved from experience with the shipbuilding industry by the Navy and the Maritime Administration. The author determined by way of interviews with Navy contracting officials that conceptually the inception of this clause was influenced by the fixed-price contracting that was predominantly used at the time. It is, in effect a Firm Fixed-Price contract escalation clause, in that it employs a fixed baseline in terms of costs subject to escalation and the time phasing of the costs.

2. Operation

In the author's opinion the clause was not overly long or complex, it was easy to administer and the only unknown at the time of contract award was the Bureau of Labor index changes that would occur over the course of the contract as a result of changing material and labor costs. A copy of this clause which was taken from a contract for a Navy replenishment ship (AOR-1) is provided in Appendix B for purposes of providing the reader the opportunity to become familiar with the operation of the provisions. Attention is directed specifically to paragraphs (b) and (c) for guidance in computing escalation recovery caused by changes in labor and material costs. Exhibit III-1 is provided to further assist in understanding the method of calculating the escalation payment due the shipbuilder under this clause. Information derived from NAVSEA data. A sample computation of labor escalation is provided in Appendix C.

3. Features

To more fully understand the operation of the Fixed-Curve escalation clause a summary, based on the author's perceptions, of the important features is provided.

a. The bureau of Labor Satistics (BLS) national shipbuilding index is used as the labor index and a weighted composite of three BLS wholesale price indices is used as the material index. The labor index is based on data supplied by 17 United States (U.S.) shipbuilders. The weights used in the material index are: Iron and Steel - 45%, General Purpose Machinery and Equipment - 40 %, and Electrical Machinery and Equipment - 15%.

b. The percentages of total costs, made up of labor, material and overhead costs that were subject to escalation are fixed or pre-set at contract award.

$$\text{ESCALATION} = \begin{array}{c}\text{AMOUNT (1)}\\ \text{OF INDEX}\\ \text{CHANGE}\end{array} \times \begin{array}{c}\text{AMOUNT (2)}\\ \text{SUBJECT TO}\\ \text{ESCALATION}\end{array} \times \begin{array}{c}\text{CONTRACT COST (3)}\\ \text{SUBJECT TO}\\ \text{ESCALATION}\end{array}$$

$$\text{(1) Amount of index change} = \frac{\text{Current Index} - \text{Reference Index}}{\text{Reference Index}}$$

(2) Amount subject to escalation = Pre-Set Expenditures per Quarter

(3) Contract cost subject to escalation = Specified Percentage of Initial Target Cost

Exhibit III-1
ESCALATION CALCULATION (1962)

c. The rates at which labor, material and overhead are to be expended are fixed or pre-set at contract award.

d. The original target cost and the escalation multiplier do not change over the course of the contract.

e. Costs that are incurred and due to contract changes are not subject to escalation recovery.

f. Escalation payments are to be made quarterly or on publication on the indices.

g. Escalation payments are to continue up to the contract delivery date and no adjustment is to be made for early or late delivery.

4. 1962 Clause Summary

Again it should be emphasized that the clause is not long or complex and does not pose an unreasonable administrative burden. There is only one unknown (BLS

indices changes) at contract award which, in the author's opinion, is an aid to administration and to the budget process for escalation funding. The indices used are of a national nature and encourage the contractor to control labor and material costs. The clause can aid in incentivizing a shipbuilder to deliver as close to contract delivery as possible. Finally, it provides for change work to be forward priced, allowing the Navy to know the full cost of changes. In summary, the clause does not to any degree reduce the incentives which the contractor would have under a Firm Fixed-Price contract.

C. ACTUAL COST CLAUSE (1975)

1. Background

During the period between the development of the Fixed Curve clause (1962) and a new clause, developed in 1975, there was change regarding the type of contract used for the acquisition of ships for the Navy. There was also change taking place in the shipbuilding industry regarding the ownership and management of the shipyards. It was also during this period that inflation became severe.

D.F. Pace's text, [Ref. 6], indicates that during the 1960s the FPI contract became the prevalent type of contract used for the acquisition of major shipbuilding programs. Pace goes on to say that DOD emphasis on the wider use of this contract form was in reaction to the extensive use of the Cost Plus Fixed Fee (CPFF) contract. The Navy, on the other hand was moving from the opposite direction in an attempt to find a less rigid arrangement than the Firm Fixed Price contract it was using.

It was also during this period that the shipbuilding industry was changing its personality. The ownership and

management of shipyards in the U.S. was changing from independent shipyards to major corporate ownership. Such entities as Litton Industries, Tenneco Incorporated, General Dynamics Incorporated, Congoleum Corporation and Ogden Corporation became the owners of such major shipyards as Ingalls Shipyard, Newport News Shipbuilding and Drydock Co., Electric Boat Division, Bath Iron Works and Avondale Shipyards, respectively. It is the author's opinion that with this kind of ownership came little shipbuilding expertise and strong emphasis on the financial aspects of the business, with profits being of great importance. This approach to the business of building ships was in contrast with the emphasis of the earlier independent shipyard owners, when the actual ship construction was of prime importance. Jacques S. Gansler, in his book The Defense Industry, [Ref. 7], comments on this very issue as follows:

> ...many of the yards have recently been taken over by large conglomerates. These takeovers have had significant positive and negative impacts on the overall industry. Modern management techniques have been introduced, but the fact that the new owners are oriented primarily toward profits, whereas the earlier owners focused on shipbuilding, has contributed to the friction between the industry and the Navy in the 1970s.

It should be added that what these large corporate entities lacked in the way of shipbuilding expertise, they made up for in financial and legal ability. They were also most adept at using the political arena to their advantage in conducting business with the Government.

Background on shipbuilding business activity during the period leading up to the development of the Actual Cost clause is needed to be able to analyze the evolution toward a new clause. It was learned through interviews with Navy contracting personnel that during the 1960s there was a major increase in Navy shipbuilding programs. This, in turn had a large impact on the business base of the major

shipbuilders, in that there was very little commercial shipbuilding activity available in the U.S.. It was learned that there was intense competition among the shipbuilders to obtain the contracts for the new shipbuilding programs.

It is interesting to note that multi-million dollar claims were to be submitted against the Navy by a number of the major shipbuilders as a result of contracts awarded for ships under these programs. In conjunction with these major cost overruns there were numerous late deliveries. Taking into consideration the large number of contract changes that are inherent in this kind of work, it is the author's opinion that the cost of much of this work was under-estimated, and the ability to acquire the numbers of skilled workers to perform the work was over-estimated by the shipbuilders. It is important for the reader to be aware of this when trying to understand the evolution of shipbuilding contract escalation provisions.

Most of the literature attributes the development of the 1975 escalation clause to the need to alleviate the rising costs of shipbuilding that were the direct result of the "spiraling inflation" during the 1970s. Upon an analysis of the 1962 and 1975 clause it is interesting to note, however, that if the ships in question had been built according to schedule and delivered according to the contract (excluding the effect of change orders), the Fixed Curve clause would have adequately reimbursed the shipbuilders for the effects of inflation, for the BLS indices were constantly changing to accomodate the rate of inflation.

It is true that the inflationary trends that began in the mid 1960s became severe in the early 1970s. The spiraling inflation of this time did in fact contribute to

the sense of urgency for a revised shipbuilding escalation clause emanating from the discussions surrounding the massive Navy shipbuilding claims at issue. There were demands from the shipbuilding industry that something be done about the economic instability that was contributing to the higher than expected costs of building ships for the Navy. The implications were that the 1962 clause was not compatible with the FPI contract that had become the accepted arrangement for acquiring modern warships.

In response to the situation, the Navy, in 1975 devised an escalation provision that was more in keeping with the FPI contract and would accomodate the desires of the shipbuilders. This clause was to be referred to as the 1975 Standard clause, the Marshall clause or the Actual Cost clause. By means of interviews and a review of the available literature it was determined that as was the case with the 1962 clause, it was developed to provide protection against labor and material cost fluctuations that might occur during ship construction. It differed from the 1962 clause in that protection to be provided the contractor was enhanced with the Government assuming more risk, the term of coverage was to be more comprehensive and payment was to be more frequent. Conceptually, it would be more in keeping with the form of contracting whereby the emphasis is on the Government providing assurance of cost recovery by the shipbuilder. Again it should be noted that the FPI contract had become accepted as the only way to acquire ships, other than in the case of the lead ship of a class.

2. Operation

The 1975 clause in comparison with the 1962 clause increased in length and complexity. It was determined by means of interviews that it became more of a burden

administratively and the number of unknowns at contract award increased, making the budgeting process more complex. A copy of the Actual Cost (1975) clause taken from an FFG-7 Class contract is provided as Appendix D. Attention is directed specifically to paragraph (c) for guidance in computing escalation recovery caused by changes in labor and material costs. Exhibit III-2 is provided to further assist in understanding the method of calculating the escalation payment due the shipbuilder under this clause.It was derived from NAVSEA data. A sample escalation computation is provided in Appendix E.

$$\text{ESCALATION} = \begin{matrix}\text{ACTUAL}\\ \text{COST}\\ \text{INCURRED}\end{matrix} - \begin{matrix}\text{ACTUAL}\\ \text{COST}\\ \text{INCURRED}\end{matrix} \text{ X } \text{INDEX CHANGE}(1)$$

(1) Index Change = Reference Index / Current Index

Exhibit III-2

ESCALATION COMPUTATION (1975)

3. Features

Again to more fully understand the operation of the Actual Cost escalation clause a summary based on the author's perceptions of the important features is provided.

a. Escalation is paid on the basis of the actual expenditure phasing of costs, as they are incurred, rather than on the basis of a pre-established and fixed phasing of costs.

b. Escalation is paid on the basis of allowable costs incurred not to exceed ceiling price rather than on the fixed basis of the initial target cost.

c. Change orders are included in the escalation coverage vice being separately forward priced. Escalation coverage is to continue through the actual delivery of the ship being constructed or until the cumulative de-

escalated costs reach ceiling price. The value of the BLS indices would remain constant or decrease for periods beyond the contract delivery date.

d. Escalation recovery is to be paid to the shipbuilder monthly on a per ship basis instead of quarterly on a contract basis as in the past.

4. 1975 Clause Summary

Under the Actual Cost clause (1975) used in Navy shipbuilding contract, escalation is defined as:

ESCALATION = COSTS INCURRED-BASE COSTS

In essence this clause acts to de-escalate ACTUAL incurred costs. The clause continues to provide coverage until the ship delivers or up to the point where the incurred base costs (COSTS INCURRED - ESCALATION COSTS) reaches the ceiling price agreed to in the contract. This is a most significant aspect of this clause in that it is essentially reimbursing the shipbuilder for all of its costs up to ceiling price. In cases where ceiling price is significantly greater than the target cost involved, considering the associated risk, the resulting arrangement approaches a cost reimbursement type contract. This is in contrast with the Fixed Curve clause where escalation was computed on the basis of pre-set cost expenditure rates.

In the author's opinion based on experience, two significant ramifications of this clause are that there is a lessening of incentive for the shipbuilder to meet the contract delivery date and there is less incentive to perform the work in the most cost effective manner from the standpoint of the government.

D. CURRENT CLAUSE

The escalation clause that is being used in some of the most recently awarded contracts is a modified version of the Actual Cost clause (1975). The modifications have been the result of an evolutionary process that has been in the direction of shifting more of the cost risk to the Government. It attempts to separately identify certain costs more specifically than the categories of Material, Labor and Indirect Costs used in the past and apply specific indices to these costs for the purpose of determining escalation recovery. Needless to say, this has added to the number of variables involved which in turn has contributed to added difficulty regarding the budgeting process and the administration of the clause. An example of the current clause which was taken from a recent Navy contract for attack submarines is provided as Appendix F for the reader interested in the specifics of the provisions entailed. It also provides some insight into the increase in length and complexity involved in current shipbuilding contract escalation provisions.

Paragraphs (C), (D) and (E) of Appendix F provide a detailed look at the extent of the separate escalation coverage. A significant aspect of these provisions aside from the extensive number of specific costs and indices involved, are the pass through provisions. The computations formula for escalation payments on employee benefits cost increases and electricity and fuel oil cost increases results in paying the shipbuilder for his actual costs. Another change since the 1975 version of the current clause is that the escalation coverage is to continue for 240 days beyond the contract delivery date. After the 240 days until actual delivery the index values remain constant or decrease for calculation purposes.

E. SUMMARY

It is the author's opinion based on the analysis that the changes from the 1962 clause to the 1975 clause was significant in that escalation coverage changed from being of a preset nature to being more of an actual reimbursement type situation. Some of the contractor's incentive was compromised by the change and there is a strong argument based on the analysis that the large business entities involved can influence contractual arrangments.

IV. ANALYSIS OF CURRENT COVERAGE

A. INTRODUCTION

The following discussion presents an analysis of the fallcut or effects of the change from the Fixed Curve clause (1962) to the Actual Cost clause (1975). The main effect was the assumption by the Government of more cost risk which in turn can adversely effect the intent of the Fixed Price Incentive (FPI) contract type to perform as effectively and effeciently as possible. There were other effects that will be discussed such as lessening of delivery incentive, increased difficulty in budgeting, increased administrative effort, loss of contract change total cost visibility and increased opportunity for wind fall profits.

B. TRANSITION FROM THE 1962 TO THE 1975 CLAUSE

The author's research indicates that the Actual Cost clause (1975) was devised to more closely appoximate and provide compensation for the actual impact on costs incurred under the contract due to economic change. Research by the authcr indicates that it was designed so that the clause would continue to provide a positive incentive to shipbuilders to meet contract delivery schedules. In addition to the above the ultimate requirement of the escalation clause continues to be to eliminate contingency costs from the contract price with the Government and the shipbuilder, sharing to some degree in the risk associated with inflaiton in the economy. Experts interviewed indicated the ultimate consequence of escalation coverage should be to reduce the overall contract cost to the

Government by not paying for costs that may never be incurred. An analysis of the Fixed Curve clause (1962) indicates that it exploits the fact that the shipbuilder has control over the incurring of labor and material costs with regard to quantity and timing. This control can result for example, through the ordering of materials, negotiating labor agreements and the development of construction schedules.

The scheduling of work is usually referred to as the phasing aspect of pricing and is critical to determining the extent to which escalation costs will be incurred. From the standpoint of overall cost to the Government, it is advantageous to incurr costs as early in the contract as possible because the normal course of the economy has been in the direction of increasing prices. The 1962 clause recognizes this and penalizes the shipbuilder (by means of the fixed expenditure mechanism) that does not adhere to an acceptable schedule but instead performs work in later, more expensive time frames. When there is not any required phasing of costs (as is the case under the 1975 clause) there is not the same incentive to manage construction scheduling so as to incurr the least amount of inflationary cost to the Government. There is less incentive from the standpoint of incurring increased escalation costs where specific indices or direct pass through mechanisms are involved which is the situation with current provisions. In effect the Government is responsible for paying escalation costs despite the time frame.

From the above discussion it would appear that there is some contradiction regarding the accepted intention of the 1975 clause and the results to which its actual operation is conducive. What in fact has happened is that the Government

has provided a contractual approach for acquiring ships that is very similar to a cost reimbursement type contract. This kind of a contractual arrangement is not conducive to stimulating the most effecient and effective construction process from the standpoint of the Government. The result can be higher costs to the Navy as a result of a contract clause that was devised to provide for cost savings under the contract.

C. SPECIFIC UNDESIREABLE EFFECTS

The following analysis involves some of the specific effects of the change from the 1962 to the 1975 clause. The topics include delivery incentive, budgeting problems, administrative burden, change visibility and windfall profits.

1. Delivery Incentive

The current escalation clause provides full coverage out to 240 days after the contract delivery date. Upon reaching the 240 day point escalation coverage continues until actual delivery at the current index, but not to exceed the index in effect at the post (240 day) deliver date. This kind of arrangement does very little to discourage the shipbuilder from not meeting the delivery date specified in the contract. Research indicated that the escalation clause was not devised to be a delivery incentive provision in shipbuilding contracts and that contract delivery incentives should be provided separately. The point to be made is that the current shipbuilding escalation clause contains a delivery dis-incentivizing aspect that can have an adverse impact on the overall cost to the Government.

The author's research shows that negative delivery incentive offers the shipbuilder business alternatives that were not intended to be provided by the clause. The opportunity to exploit the clause under a particular contract for business purposes, can come about when there is either more pressing work in the yard or very little other work in the yard. When there is very little other work available the shipbuilder can stretch out the contract work in order to keep people employed and maintain skill levels in anticipation of future work. The other situation arises when there is more pressing work whereby the shipbuilder stands to suffer financial loss should that work not be completed as scheduled.

In the situation discussed above the business decision that will, in the author's opinion, most likely be made will be to stretch out the delivery of the Navy work because there is much less risk of adverse financial consequences. This is a result of the current escalation clause providing almost full coverage until actual delivery depending on the extent of delay. For clarification purposes the stretchout of the Navy contract delivery comes about by the shipbuilder removing resources (manning, industrial capability) from that contract and applying it to more pressing contracts. The result is that the Government can be placed in the position of subsidizing commercial work without having any choice in the matter. The undesireable effect again, is that because the work is performed in a later time frame, it is more costly. Another more long range effect is that late delivery of ships can adversely impact Navy operational commitments.

2. Budgeting Problems

The author's research showed that from a budgeting standpoint the 1975 clause is more difficult than the 1962 clause. The event of the 1975 clause introduced two new variables that would impact funding/budgeting. These variables are the changing base cost and the use of the actual phasing of costs. The 1962 clause based escalation computations on the initial target cost of the contract and on a pre-set time phasing of when these costs were to be incurred. The 1975 clause bases computations on incurred costs (which are always increasing) and on the actual phasing (of which the contractor has some controls). These two variables contained in the 1975 clause make it more difficult for forcasting escalation costs for budgeting purposes than under the 1962 clause containg less varialble provisions. The budgeting issue is significant because it is necessary for the Navy to have funding available for projected escalation costs at the time of contract award. If the Navy underestimates these costs it must return to Congress for funding increases which can jeopardize credability. On the other hand, should the costs be over estimated, the Navy will have funds tied up unnecessarily and not be serving a useful purpose.

3. Administrative Burden

By way of experience and through interviews it was determined that from an administrative standpoint the 1975 clause has caused an increase in effort required to manage escalation payment over that required of the 1962 clause. The increased effort is a result of more variables including those noted above as well as the increase in specific indices that have to be applied to specific costs. The 1962 clause required computations for only two categories of

cost, namely labor and material costs. The current edition of the 1975 clause contains six separate categories of costs for which individual computations are required. The more categories of costs involved results in more specific cost accumulations which require accounting and clerical work. Increased administration effort occurs because of the sheer complexity and length of the clause in that it requires more time and effort on the part of those involved to merely understand it. This aspect impacts those involved in negotiating the contract to contain the clause down to those having to perform the clerical work. It also includes those having to perform budget projections. From the standpoint of having to negotiate complex, longterm shipbuilding contracts, it is not, in the author's opinion, advantageous to either party involved to have overly complex clauses that can muddle negotiations and lead to adversarial conditions in the long run. The Navy's experience has been that the long run results can be very costly as was the case in the massive shipbuilding claim settlements that occurred in the late 1970s.

4. Contract Change Visibility

The author's experience has shown that due to the complexity of Navy shipbuilding and to the requirement that weapon systems be as modern as possible there are numerous changes to the contract design. The expense involved can be great and it is important that they be managed properly to best utilize available funding.

From the presentation provided in Chapter III it follows that under contracts where the 1975 escalation clause is used changes are priced in base month dollars as is the basic contract. The change base cost and profit are added to the current contract base cost and profit and are

provided escalation coverage by means of the escalation clause. Under contracts containing the 1962 clause, contract changes were fully forward priced and did not come under the coverage of the contract escalation clause.This provided the Navy better visibility of the full cost of changes and more opportunity for effective management of same. In the author's opinion not having full visibility tends to aggrevate the budgeting difficulty of projecting escalation costs for the initial contract that was discussed earlier. It is significant to manage changes properly in order to avoid situations such as the massive shipbuilding claims that were settled in the late 1970s where the Navy suffered much criticism from industry and the Congress concerning contract changes.

5. Windfall Profits

By way of an analysis of the data provided previously and from information provided in a Comptroller General Report, [Ref. 8], it was determined that another effect of the 1975 escalation clause is that there exists the opportunity for the contractor to earn a profit windfall. This can happen because escalation costs are not considered part of the basic contract costs. To elaborate, escalation costs are not considered in the computation of the contract target cost, target profit, target price or ceiling price and are not subject to the contract incentive pricing provisions. Because of the mechanics of the escalation computations, escalation costs are subtracted from actual incurred cost to derive the costs subject to the incentive provisions. It follows that the more costs the shipbuilder can incur as escalation costs, the less costs there will be that are to be considered as base costs and to be subject to the incentive sharing provisions. Under these

provisions the situation is such that the shipbuilder gains something in profit for cost savings. This situation occurs when the Navy allows escalation to be paid on costs that are not effected by inflation. An example of such costs are fixed subcontracted costs and certain overhead costs such as depreciation, prepaids, rental costs, leases and taxes.

6. Profit on Escalation/Unrecoverable Escalation

There are two remaining aspects of the current escalation clause that merit discussion. In the author's opinion they are undesireable in that they increase the Government's overall cost liability on shipbuilding contracts while reducing the contractor's risk. It should be noted that the aspects in question, namely the paying of profit on escalation and the allowance of unrecoverable escalation in the contractor's contract pricing are not due to the mechanics of the 1975 clause as much as they are due to the approach to escalation coverage that the clause represents. Even so, a discussion of these issues is considered appropriate.

Concerning the issue of paying profit on escalation the author's research indicates that the Navy is currently considering projected inflationary costs associated with ship construction contracts in the computation of profit. The interesting aspect to be considered regarding escalation coverage is the amount of profit to be allowed has been viewed from a business perspective as being commensurate with the amount of risk involved. The current situation with regard to the Actual Cost Escalation clause is one where the Government has assumed the majority of the cost risk and at the same time is willing to pay increased profits.

The other issue mentioned above concerns the fact that some shipbuilders are including in their contract pricing the expected cost of escalation they feel will not be recovered through the escalation clause. This is of course, less than desireable in that the essence of having escalation clauses is to eliminate contingency pricing. This can result in added costs to the Government, especially in negotiated procurements where competition is not a significant factor and the target cost is inflated.

D. DESIREABLE ASPECTS

In the author's opinion the evolution of shipbuilding contract escalation clauses has produced some desireable effects. From the shipbuilders standpoint cost risk has been reduced substantially. As discussed earlier the current escalation clause in conjunction with the Fixed Price Incentive contract has provided an arrangement that fast approaches a Cost Reimbursement type contract. From a businessman's perspective it would be reasonable to expect this kind of arrangement would be desireable considering the length of the contract and the complexity involved.

The current escalation provision is desireable from the Navy's standpoint primarily because it accomodates all of the factors that influence the process and allows needed ships to be acquired. As noted above it satisfies the shipbuilders business requirements and it appears to pacify (money continues to be appropriated) the Congress by not having to resort to cost type contracts. The clause can also aid in enhancing the Navy's image with regard to its relations with shipbuilders. The current clause provides close to actual escalation coverage and the Navy has further reduced the shipbuilder's cost risk by means of cost like incentive pricing provisions which means there should be

less likelihood of shipbuilder's claims. This is most advantageous to the Navy. Experience has shown that the claims settlement process can be disruptive to Navy shipbuilding and extremely expensive. This was borne out by the experience gained during the recent claim settlements with major shipbuilders. The author's experience and research indicate that these proceedings consumed many years of effort from the people who were otherwise required to be facilitating new shipbuilding acquisition and administering ongoing contracts. A review of the settlements by the author shows the costs involved were enormous ($165M for one major shipbuilder) and involved Public Law 85-804 money which had to be approved for use by the Congress on the basis that it was required to facilitate the national defense. It is the author's opinion that it is desireable to avoid this kind of visibility in that it could convey mismanagement of public monies with the possibility of future Navy shipbuilding funding being reduced.

E. SUMMARY

The change from the 1962 clause to the 1975 clause was significant. The Government assumed more cost risk, some natural incentivization was compromised and there were adverse effects including increased complexity. The new clause aided in making for more cost like contractual arrangements but it did enable the Navy to continue to acquire ships.

V. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

The purpose of the paper was to objectively review the evolution of the current shipbuilding escalation clause with the intent of drawing some conclusions concerning how and why the clause developed, the complexity involved, extent of coverage and its effect. The paper reviewed the types of shipbuilding contracts and the important factors that influence them. The purpose, operation and historical development of escalation coverage was provided. Finally, the change in the Navy's approach to escalation coverage from 1962 to 1982 was analyzed.

B. CONCLUSIONS

The current shipbuilding escalation clause is the result of an evolutionary process that had its beginning during a time when the Navy was confronted with the requirement to obtain ships for a major armed conflict. During the early history of the clause there developed concepts such as paying escalation based on actual cost computations as well as paying escalation on a direct pass thru basis. These are concepts that are in use today in major shipbuilding programs.

Based on the research and analysis of the available data the author contends that there are some very basic reasons why the Navy has the kind of escalation clause that is currently being used. One reason is that the product, namely modern warships, is inordinately complex and requires a difficult construction process that most often spans a

considerable period of time. This construction process is labor intensive and requires major investment in plant and equipment. A second reason is that the business entities that control the major shipbuilding cpapacity in the United States are very large and posess financial strength. They also posess ample political influence. These entities have been willing and able to influence contract provisions by means of negotiations and by way of the political forum. The research indicated the involved business entities desires the most risk free, highest return kind of contractual arrangement.

A third reason for the current escalation clause is that the Navy has to do business with the major shipbuilders. The research indicated that the requirement for modern warships is pressing both from the standpoint of need and also from the standpoint of the necessity to spend the available funding as quickly as possible. If the Navy cannot agree to terms with major commercial shipbuilders, there are no alternative means of acquiring ships. The shipbuilders are cognizant of the situation and are able to take advantage of the situation to press for desired contractual provisions. A fourth reason for the current clause is it enables the Navy to continue to use a fixed price type of contract to accomodate buying a product that might better lend itself to a cost type of contract. Cost type contracts also tend to be alarming to the public.

The final reason for the current escalation clause, in the opinion of the author, is the mistaken belief that the shipbuilder overruns that were incurred during the recent period of spiraling inflation were due solely to the ineffectiveness of the 1962 clause. There was in fact spiraling inflation but the operation of the 1962 clause was

based on a national index that was to a pre-set phasing of contractor work agreed to at time of contract signing. This allowed the shipbuilder to recover escalation payments commensurate with the activity in the economy as long as he built the ship according to contract schedule.

The clause in the author's opinion has become overly long and complex which can be dysfunctional from the standpoint of negotiations and administration. It also adversely impacts the budgeting process. The complexity has evolved from the desire to be very specific about the measurement of escalation coverage. What began as a process of trying to provide an estimate of escalation costs has involved into an attempt at an exacting process using more individual categories of costs and special indices. The author's research shows that the complexity has been due to an incremental process that has lent itself to becoming a situation that is not fully appreciated with regard to the liability it creates for the Government.

It is the author's opinion that the escalation coverage provided by the current clause is excessive in that it provides extensive opportunities for the shipbuilder not to perform as efficiently as possible from the standpoint of cost to the Navy. By basing computations on actual incurred costs, extending coverage until actual delivery and providing special indices, the shipbuilder is assurred ample escalation coverage throughout construction and is motivated to operate in a manner that is most beneficial to the company. It is the opinion of the author that the current escalation clause, in conjunction with the Fixed Price Incentive (FPI) type of contract has created an arrangement that is very much like a cost type of contract. Kenneth R. Andrews of the Harvard Business School, [Ref. 9] notes the

following concerning contract incentive regarding cost type contracts:

> A manufacturer who plans to perform services for the government under cost-plus-fixed-fee contracts, to cite a very limited example, feels less need for a fully developed cost control system and cost related incentives than one whose contracts are governed by a fixed price.

It is the author's opinion this is the situation with regard to the use of FPI/Escalation contracts in shipbuilding which provides the opportunity for increased costs to the Government.

Regarding the current clause's impact, the author concludes from the research and analysis the clause is having some adverse impact on the shipbuilding process. This has become evident in the form of delivery, disincentivization, increased difficulty in budgeting, increased complexity and administration and the opportunity for increased profits due to the extent of escalation coverage and the mechanics of the shareline. While all these items are of concern the disincentive to deliver is a serious failing in the current clause. Delivery dates are significant because of Navy operational requirements and because they are an important aspect of the cost and fee determination that is agreed to at contract award.

The Navy has agreed to pay a specified contract price for a specified delivery and it is dysfunctional to include escalation provisions that contain delivery disincentivization.

The comments preceeding this are not an attempt to discredit shipbuilders as business entities or to imply their actions are immoral or unethical. The point to be made is it must be kept in mind that much of their design and reason for being is to make a profit and it should be

expected they will make business decisions accordingly. If contractual arrangements are such that the opportunity exists for a contractor to enhance its business situation at the Government's expense and be within the confines of the mutual agreement (the contract) it should be expected it is going to happen. The current shipbuilding escalation clause does provide this kind of opportunity which can have an adverse impact on the shipbuilding process, effect operational requirements and cause increase costs to the Government.

C. RECOMMENDATIONS

It is recommended this analysis be used as a basis for further study to determine if an alternative to the current shipbuilding contract escalation clause can be devised. One alternative would be to eliminate the clause completely by resorting to a cost type contractual arrangement. At a minimum, consideration should be given to the elimination of the disincentivization to contract delivery and to performing work from the standpoint of the Government in the most cost effective way. It is also recommended that consideration be given to consolidation of the current clause with the intention of lessening its length and complexity.

APPENDIX A

GUIDE FOR FIXED PRICE INCENTIVE CONTRACTING

Fundamentals of Incentive Contracts

In essence, nearly all incentives take the form of a sharing arrangement, generally expressed as a percentage ratio. For example, if a 60/40 cost sharing formula were negotiated, the Government would pay 60 cents, and the contractor 40 cents, of every dollar by which actual costs increased.

Conversely, for every dollar saved, the Government would retain 60 cents, and the contractor's profit (or fee) would increase by 40 cents. In other words, over the range of costs where the sharing arrangement is operative, the contractor must look at every dollar he spends as though 40 percent of it were his. Profit or fee is thus tuned to the contractor's control of a variable on which his management skills can have a significant effect.

Under a cost incentive element the amount of profit the contractor earns is based on the amount by which his actual costs exceed or are kept below the target costs. Actual costs are negotiated on a fixed-price-incentive contract. Once negotiated final costs are determined, the final profit or fee is automatically computed in accordance with a sharing formula already in existence.

The Fixed-Price-Incentive Contract

Under the fixed-price-incentive-firm (FPIF) contract, the Government and the contractor negotiate the following elements before award:

(i) target cost (against which to measure final costs,
(ii) target profit (a reasonable profit for the work at target cost),
(iii) ceiling price (the total dollar amount for which the Government will be liable),
(iv) sharing formula (the arrangement for establishing final profit and price).

After the work is completed, the contractor and the Government negotiate the final costs of the contract, sharing the overruns or underruns according to the agreed-upon formula. To illustrate with figures; assume that the target cost for a contract is $100, the target profit is $10, the price ceiling is $118, and the sharing formula is 75 percent (Government) and 25 percent (contractor). Under the formula, the contractor would keep 25 percent of every dollar saved. To earn a total profit of $12, therefore, he would have to reduce costs by $8 below target cost. And, since there is no profit ceiling, profit would continue to increase indefinitely as the amount of underrun increased. Conversely, the contractor would have to overrun the target cost by $8 to reduce his profit to $8. If he overran by more than $18, he would lose money, since there is no minimum profit guaranteed in this contract type. Regardless of the final cost to the contractor, he must meet the contractual specifications, and the Government's liabilityo cannct exceed the ceiling price of $118. For this reason, the FPIF contract should be used in preference to any cost reimbursement type whenever circumstances permit.

APPENDIX B

AOR-7 CLAUSE (1962)

ARTICLE 8. COMPENSATION ADJUSTMENTS (LABOR AND MATERIAL)

(a) Regardless of the actual changes in the cost of labor or materials during the performance of this contract, adjustments in compensation shall be made as provided in paragraphs (b) and (c) of the Article. Said adjustments are based solely on the changes in the Labor Index identified in paragraph (b) of the Article and the Material Index identified in paragraph (c) of this Article. Each Supplemental Agreement entered into pursuant to this Article shall set forth the calculations upon which the adjustment in compensation are made. For the purposes of this Article 33% of the Target Cost shall be deemed to constitute the labor cost subject to adjustment and shall be apportioned as shown in the second colunm of Table 1 of paragraph (b) hereof. Similarly, 61% of the Target Cost shall be deemed to constitute the material cost subject to adjustment and shall be apportioned as shown in the second column of Table 2 of paragraph (c) hereof. No part of said Tables 1 and 2 shall be revised, unless this contract is partially terminated and then only as provided in subparagraph (f) (2) of this Article.

(b) Adjustments in compensation on account of changes in labor cost shall be made as follows for each quarterly period shown in the first column of Table 1 for this paragraph based on the changes in the Nationwide "Index of Changes in Straight Time Average Hourly Earning for Selected Shipyards"(June 1962 = 100) for steel ship construction herein sometimes called the "Labor Index", furnished to theNaval Ship Systems Command (Ed. note: Now called Naval Sea Systems Command) by the Bureau of Labor Statistics of the United States Department of Labor: (1) The Labor Index for the base month of April 1972 shall be subtracted from the Labor Index for the quarterly period involved, determined in accordance with peragraph (d) below, and the difference computed as a plus or minus figure as the case may be.
(2) The aforesaid difference, whether plus or minus, shall be divided by the Lavor Index for the base month and the resulting quotient carried to four decimal places.
(3) The aforesaid quotient shall be multiplied by the percentage of the Target Cost set forth in the third column of Table 1 below, opposite the quarterly period involved, and the resulting product carried to six decimal places.
(4) The aforesaid product shall be multiplied be $(Target Cost). The resulting amount shall constitute the amount of the adjustment in compensation for the quarterly period involved.
(5) The amount of the adjustment in compensation shall be upwards or downwards depending upon whether the difference in the labor indices calculated in subparagraph (1) above is a plus or minus figure, as the case may be, and shall be set forth in a Supplemental Agreement to this contract.

TABLE 1

LABOR (33% of Target Cost)

Qtr	% of Labor	% of Target Cost
1	0.4	0.1
2	0.8	0.3
3	1.2	0.5
4	3.0	1.0
5	6.8	2.2
6	9.5	3.2
7	13.1	4.3
8	15.5	5.1
9	17.3	5.7
10	15.6	5.1
11	12.2	4.0
12	4.6	1.5
	-----	----
	100.0%	33.0%

(c) Adjustments in compensation on account of changes in material costs shall be made for each quarterly period shown in the first column of Table 2 below, based on the changes in the "Material Index for Naval Ship Systems Command Steel Vessels Contract", herein sometimes called the "Material Index", furnished to the Naval Ship Systems Command by the Bureau of Labor Statistics of the United States Department of Labor:

(1) The Material Index for the base month of April 1972 shall be subtracted from the Material Index for the quarterly period involved, determined in accordance with paragraph (d) below, and the difference computed as a plus or minus figure as the case may be.

(2) The aforesaid difference, whether plus or minus, shall be divided by the Material Index for the base month and the resulting quotient carried for four decimal places.

(3) The aforesaid quotient shall be multiplied by the percentage of the Target Cost set forth in the third column of Table 2 below, opposite the quarterly period involved, and the resulting product carried to six decimal places.

(4) The aforesaid product shall be multiplied by $(Target Cost). The resulting amount shall constitute the amount of the adjustment in compensation for the quarterly period involved.

(5) The amount of the adjustment in compensation shall be upwards or downwards depending upon whether the difference in the labor indices calculated in subparagraph (1) above is a plus or minus figure, as the case may be, and shall be set forth in a Supplemental Agreement to this contract.

TABLE 2
MATERIAL (61% of Target Cost)

% OF QTR	% OF MATERIAL	TARGET COST
1	2.5	1.5
2	8.5	5.1
3	18.0	11.0
4	20.0	12.2
5	16.0	9.8
6	11.0	6.7
7	8.0	4.9
8	7.0	4.3
9	5.0	3.1
10	3.0	1.8
11	1.0	0.6
12	-	-
	100.0%	61.0%

(d) For the purpose of this Article:

(1) The first quarterly period shall commence on the first day of the calendar month following the effective date of the contract.

(2) The term, "Target Cost", as referred to herein, shall be the target cost in effect at the effective date of this contract.

(3) For the purposes of computing the amount of adjustment in compensation, the amount of Target Cost set forth in subparagraphs (b) (4), and (c) (4) shall not be revised unless this contract is partially terminated and then only to the extent provided in paragraph (f) (2) of this Article.

(4) The Labor Index and Material Index for a quarterly period shall be the arithmetical average carried to one decimal point of the Labor Index or Material Index, as the case may be, for each of the three months comprising such quarterly period.

(e) Nothing contained in this Article shall be construed as prohibiting the inclusion of changes in the cost of labor or material in any adjustment in the target cost, target profit, target price, ceiling price, or total final price provided for under any other provision of this contract.

(f) (1) If this contract is terminated in whole, for any reason, no compensation shall be made under this Article for any quarterly period subsequent to the quarterly period during which the contract is terminated.

(2) In the event that this contract is terminated in part, and such partial termination terminates the completion of one or more vessels, then, notwithstanding any other provision of this Article, the target cost set forth in paragraphs (b) and (c), the percentages of target cost set forth in paragraph (a), and each column of Table 1 of paragraph (b) and table 2 of paragraph (c) shall be adjusted for the reduction in the number of vessels to be completed under this contract.

(g) Deferred payments for escalation shall be paid promptly, upon submission of invoices, whenever such

payment, when added to the total of all payments previously made under the contract, would not exceed ninety-five percent (95%) of the costs certified by the Contractor on such invoice to have been incurred by it in the performance of the contract. Upon delivery of the last vessel under this contract, any remaining deferred payments for escalation shall, upon submission of invoices, be promptly paid. In the event that the amount shown in any Supplemental Agreement pursuant to paragraphs (b) and (c) above is a minus figure, such amount shall be deducted from the next invoice(s) presented for payment under this contract until such amount has been offset or recouped in full.

(h) No adjustment shall be made in the target cost, target price, or ceiling price on account of upwards or downwards adjustment in compensation made in accordance with this Article and hence said adjustments are outside the incentive price revision formula provided for in Article 8, "INCENTIVE PRICE REVISION (FIRM TARGET)". Accordingly, even if the ceiling price is exceeded, amounts otherwise payable to the Contractor in accordance with this Article shall continue to be paid.

(i) Any dispute arising under this Article shall be determined in accordance with provisions of the "DISPUTES" clause of the contract.

(j) In the event that the labor or material indices for the quarterly period involved have not been furnished to the NAVSEA by the Bureau of Labor Statistics by the end of the ensuing quarter, compensation adjustments for the quarterly period involved shall be made based upon the average of the changes in the indices for the preceding four quarters for which indices have been computed and furnished by the BLS. The average of changes so calculated shall be added to the applicable index for the immediately preceding quarterly period and the sum shall constitute the labor or material index for the quarterly period involved. When an index for the quarterly period involved is computed and furnished by BLS, the Contractor shall reflect any required corrections for the quarterly period involved in the submittal for adjustment for the following quarter.

APPENDIX C

SAMPLE OF COMPUTATION OF LABOR ESCALATION UNDER 1962 CLAUSE

1. Reflected below is a sample computation of the labor escalation adjustment for the 6th quarterly period under a contract containing the 1962 clause. The sample assumes:

a. The date on which the contract was signed is December 1962.

b. The labor percentage specified in paragraph (a) of the article is 29%.

c. The base month for labor is September 1962.

d. The contract target cost stated in the clause is $31,972,000.

e. The labor escalation table specified is as follows:

Quarterly period	Percent of labor cost apportioned to quarterly period	Percent of contract cost subject to adjustment for changes in labor cost apportioned to quarterly period
1	1	.3
2	1	.3
3	1	.3
4	4	1.2
5	6	1.7
6	9	2.6
7	12	3.5
8	12	3.5
9	14	4.0
10	17	4.9
11	13	3.8
12	7	2.0
13	3	.9
	----	----
	100%	29.0%

f. The labor indices furnished by the Bureau of Labor Statistics for the three months comprising the 6th quarterly period are as follows:

Month	Index
April 1964	102.0
May 1964	102.2
June 1964	102.4

2. Difference between 6th Quarter Labor and Contract Base Month Index.

Average 6th Quarter Labor Index

Month	Index
April 1964	102.0
May 1964	102.2
June 1964	102.4

Total	306.6
Average	102.2

Increase in 6th Quarter Index over Contract Base Month Index of September 1962.

Average for 6th Quarter	102.2
Base Month Index	100.9

Difference	1.3

3. Percentage Increase in Labor Index.

1.3 Difference / 100.9 Base Month = .012884
Rounded off four decimal places = .0129

4. Percentage Increase in Labor Index for the 6th Quarter.

labor Percentage Increase	.0129
6th Quarter Allocation	x .026
6th Quarter Increase	.0003354
Rounded off six decimal places	.000335

5. Dollar Adjustment in Contract Target Cost for Labor Increase in the 6th Quarter.

Contract Target Cost	$31,972,000
6th Quarter Increase	.000335
Dollar Adjustment	$10,710.620000

APPENDIX D

FFG-7 CLAUSE (1975)

(a) General

The contract price agreed to by the parties reflects the labor and material price levels of the base month identified in paragraph (d) below. It is anticipated that the Contractor's actual costs for labor and material may change from the labor and material costs projected on the basis of such price levels and the parties desire to provide for adjustment to the compensation to reflect such changes. However, regardless of the actual changes in the costs of labor and material experienced during the period of performance, compensation adjustments shall be computed and effected solely on the basis of monthly changes in the Labor and Material Indices identified below, in accordance with the procedures specified herein.

(b) Monthly Period

Except as hereinafter provided in paragraph (e), adjustments in compensation shall be made for each monthly period following the effective date of this contract until delivery of the last vessel to be delivered under the contract. For the purpose of this Article, a "monthly period" or "monthly period involved" shall begin on the first day of a calendar month and shall end at the end of the last day of that calendar month; except that"monthly period" shall include the calendar months of the effective date of this contract and the delivery date of the last vessel to be delivered under the contract, respectively.

(c) Costs Subject to Compensation Adjustment

(1) For the purpose of this Article, the elements of cost which will comprise the monthly costs of the contract subject to adjustment are (i) direct material costs, (ii) direct labor costs, and (iii) 75 % of indirect costs; the remaining 25% of indirect costs are not subject to adjustment. The costs subject to compensation adjustment under this Article include the costs of performance of change orders or other work for which the contract price is subject to adjustment pursuant to the "Changes" clause or pursuant to other provisions of the contract. Accordingly, all such contract price adjustments shall be priced on the basis of the labor and material price levels of the base month identified in paragraph (d) below. For the purpose of this contract, the terms "direct material costs", and "indirect costs" shall have the meanings and shall be allowable in accordance with Section XV of the Armed Forces Procurement Regulations in effect on the date of this contract.

(2) Within 15 days following the end of each monthly period, the Contractor shall submit to the Government (i) a certified statement of the costs incurred by vessel, for each vessel under the contract during that monthly period ("monthly costs") and (ii) a certified statement of the total cumulative costs incurred for all vessels under the contract from the effective date of the contract to the end of that monthly period ("total costs"). The statement of monthly costs shall separately identify the direct material costs, the direct labor costs, and the indirect costs incurred during that monthly period for each vessel.

(3) For the purpose of this Article, monthly costs and total costs are costs which are "incurred costs" as that term is defined in paragraph
(a) (iii) of Article 4, "Payments", except that:
(i) incurred costs for material shall also include the full amounts of all billings received from vendors during the monthly period involved, whether or not the Contractor has paid the full amount of such billings.
(ii) incurred costs shall exclude the amounts determined in accordance with the contract provisions identified in paragraph (a) (1) (ii) of Article 6, "INCENTIVE Price Revision" of this contract (ED. note: any items fully forward priced and separately accounted for).

(4) The costs identified in the preceding subparagraphs shall be subject to Government verification upon submission by the Contractor of the ceritified statements of such costs.

(d) Labor and Material Indices

(1) Adjustments in compensation on account of changes in direct material costs shall be based on the changes in the "Index for Steel Vessel Contracts", (1957 = 100) (herein sometimes called the "Material Index") furnished to the Naval Sea Systems Command by the Bureau of Labor Statistics of the Department of Labor(BLS). For the purpose of this contract, the base month for the Material Index shall be May 1974.

(2) Adjustments in compensation of account of changes in direct labor costs and on account of 75% of indirect costs shall be based on the changes in the "Indexes of Change in Straight-Time Average Hourly Earnings for Selected Shipyards for Steel Vessel Construction and All Regions" (June 1962 =100) (herein sometimes called the "Labor Index), furnished to the Naval Sea Systems Command by the Bureau of Labor Statistics of the Department of Labor (BLS). For the purpose of this contract, the base month for the Labor Index shall be May 1974.

(3) In the event that the Labor or Material Index, or both, for the monthly period involved is unavailable to the Contractor at the end of that monthly period, compensation adjustments pursuant to this Article shall be based upon the average of monthly changes in the applicable Index for the previous 3 months for which BLS indices are available. The average of changes so calculated shall be added to the applicable index for the immediately preceding monthly period and the sum shall constitute the Labor or Material Index for the monthly period involved. When the BLS Index for that monthly period has been made available, the compensation adjustment for that monthly period shall be recomputed on the basis of such BLS Index, and any additional payment to or repayment by the Contractor required by such recomputation for that monthly period shall be reflected in any invoice(s) thereafter submitted for payment under any provision of this contract until such amount has been paid, offset or recouped in full.

(4) In the event that the Final Labor or Material Index, or both, for any monthly period differs from the Labor or Material Index previously made available by BLS for that monthly period, the compensation adjustment for the Monthly period shall be recomputed on the basis of such Final Index and any additional payment to or repayment by the Contractor required by such recomputation for that monthly period shall

be reflected in any invoice(s) submitted thereafter for payment under any provision of this contract until such amount has been paid, offset or recouped in full.

(5) The Contractor shall be responsible for the claculations involving the Indices provided for in this paragraph and said calculations shall be subject to verification by the Government.

(e) Computation

(1) The direct material costs for each vessel certified on the statement of monthly costs shall be multiplied by the base month Material Index and the product thereof shall be divided by the Material Index for that monthly period, provided however, that in respect of any monthly period commencing after the delivery date then set forth in Section H for such vessel to be delivered under the contract, the above product shall be divided by the Material Index for the monthly period of the aforesaid contract delivery date or by the Material Index for that monthly period, whichever is the lesser; provided, further, that in the event thereafter such contract delivery date is extended for reasons of Government responsibility or excusable delay, the compensation adjustment for each month of such extention shall be recomputed on the basis of the Material Index for such month. The result of each computation for each vessel shall be expressed in dollars and cents.

(2) The direct labor costs plus 75% of the indirect costs certified on the statement of monthly costs for each vessel shall be multiplied by the base month Labor Index, and the product thereof shall be divided by the Labor Index for that monthly period commencing after the delivery date then set forth in Section H for such vessel to be delivered under the contract, the above product shall be divided by the Labor Index for the monthly period of the aforesaid contract delovery date or by the Labor Index for that monthly period, whichever is the lesser; provided, further, that in the event thereafter such contract delivery date is extended for reasons of Government responsibility or excusable delay, the compensation adjustment for each month of such extention shall be recomputed on the basis of the Labor Index for such month. The result of each computation for each vessel shall be expressed in dollars and cents .

(3) The amounts of the results of (1) and (2) above, for each vessel, and the amount of the 25% of indirect costs for each vessel certified on the monthly statement which are not subject to adjustment shall be added, and the sum shall constitute the "Base Cost" for such vessel for that monthly period.

(4) The Base Cost for each vessel for the monthly period involved shall be subtracted from the monthly costs of such vessel and the resulting difference (plus or minus) shall constitute the amount of the adjustment in compensation for the monthly period involved for each vessel, provided, however, that no adjustment in compensation shall be made in the event that the cumulative sum of the Base Costs of all vessels for all preceding months exceeds the Ceiling Price then set forth in the contract; provided, further, that in the event the Ceiling Price thereafter is increased, adjustment in compensation shall be made for each month that the cumulative sum of the Base Costs of all months preceding such month does not exceed such increased Ceiling Price.

(5) The amount of the adjustment in compensation for each vessel determined as above, (plus or minus), shall be set forth in a Supplemental Agreement to this contract, which also shall set forth the computations upon which the adjustment in compensation is based.

(6) In the event that the amount shown in any Supplemental Agreement pursuant to subparagraph (e) (5) above is a minus figure, such amount shall be deducted from any invoice(s) presented for payment under any provision of this contract until such amount has been offset or recouped in full.

(f) Payment of Compensation Adjustment

Payments of amounts of compensation adjustment under this Article shall be made monthly, after submission and verification of the information and calculations required by the paragraphs (c), (d), and (e) above, and after execution of the Supplemental Agreement pursuant to subparagraph (e) (5) above, and upon submission of proper invoices by the Contractor, subject to any adjustments pursuant to subparagraphs (d) (2), (d) (3), and (e) (6), as applicable; provided, that any such payment shall be deferred to the extent of the amount that such payment, when added to the total of all payments previously made under the contract (other than payments made pursuant to paragraphs (b) and (d) of Article 4, "Payments") would exceed the amount of the total costs. Payment of such deferred amount shall be made promptly, upon submission of proper invoices by the Contractor, whenever such amount, or portion of such amount, when added to the total of all payments made under the contract (other than payments made pursuant to paragraphs (b) and (d) of Article 4, "Payments") would not exceed the amount of total costs. Upon delivery of the last vessel under this contract, any remaining deferred payments for compensation adjustments shall, upon submission of proper invoices by the Contractor and verification thereof by the Contracting Officer, be promptly paid.

(g) Inspection of Records

The Contractor shall maintain and make available for inspection by the Contracting Officer or his duly authorized representatives, in addition to such books, records, and papers otherwise required under this contract to be maintained and made available to the Government for examination, such books, records, and papers as may be necessary (i) for the verification of the costs certified by the Contractor have been incurred, and (ii) for the evaluation and substantiation of any compensation adjustment requested under the provisions of this Article. Errors in the statements of costs incurred and/or in the computation of compensation adjustments shall be corrected promptly, and such correction shall be reflected in the next invoice submitted after such correction. (Failure of the Contractor to comply with any provision of this paragraph (g) shall constitute proper grounds for the witholding of any and all payments under any provision of the contract until such time as the Contractor fully complies with all provisions of this paragraph to the satisfaction of the Contracting Officer.)

(h) Disputes

Any dispute arising under this clause shall be determined in accordance with provisions of the "Disputes" clause of Section L.

APPENDIX E

1975 CLAUSE FORMULA FOR ESCALATION PAYMENT

Symbols:

ESC = Escalation
L = Labor
M = Material
O = Overhead
BLS = Bureau of Labor Statistics
I = Index
b = Base
c = Current

Formula:

Escalation payments are computed by the following formula:

Monthly Esc. (LMO) = Actual Monthly Costs - Base Costs

where,

Monthly Costs = A + B + C
A = Material Cost: full actual costs, including any contractor withholding from vendors
B = Labor Costs: Actual paid direct labor costs
C = Indirect Costs

and, Base Costs = (D) (A) + (E) (B) + (E) (P) (C) + (1-P) (C)
D = BLSI(b) / BLSI(c) (for material)
E = BLSI(b) / BLSI(c) (for labor)
P = a fraction defined in the contract; (P = 90% is commonly used)

Example:

Let actual monthly costs be:

A	=	Actual Monthly Material Costs	= $ 500,000
B	=	Actual Monthly Labor Costs	= $1,000,000
C	=	Actual Indirect Costs	= $ 900,000
A + B + C	=	Actual Monthly Costs	= $2,400,000

And Base Costs be determined by:

$$D = \frac{\text{BLSI(M) Base Period}}{\text{BLSI(M) Current Period}} = \frac{110}{100} = 0.0901$$

$$E = \frac{\text{BLSI(L) Base Period}}{\text{BLSI(L) CurrentPeriod}} = \frac{100}{120} = 0.8333$$

P = 90%
(1 - P) = 10%

Then escalation recovery is given by:

$$\begin{aligned}\text{Monthly Esc.} &= (A+B+C) - [(D)(A) + (E)(B) + \\ &\quad (E)(.9)(C) + (.1)(C)] \\ &= 2{,}400{,}000 - [(.9091)(500{,}000) + \\ &\quad (.833)(810{,}000) + (90{,}000)] \\ &= 2{,}4000.000 - 2{,}052{,}823 \\ &= \$347{,}177\end{aligned}$$

APPENDIX F

SSN 688 CLASS CLAUSE (CURRENT)

COMPENSATION ADJUSTMENTS (LABOR AND MATERIAL)

(a) General

(1) The contract prices agreed to by the parties reflect the price levels of the base periods identified in paragraph (d) below. It is anticipated that the contractor's actual costs may vary from the price levels of the base periods and the parties desire to provide for adjustment to compensation to reflect such variations. However, regardless of the actual variations in the costs experienced during the period of performance, adjustments in compensation because of such variations shall be computed and effected in accordance with the procedures specified herein.

(2) Except as hereinafter provided in paragraph (e) (3), adjustments in compensation shall be made in respect of each individual vessel for each monthly period commencing January 1980 and ending with the monthly period in which the actual delivery of the last vessel to be delivered under the contract occurs or the monthly period in which the "Post Delivery Date" (see paragraph (a) (3) below) of the last vessel occurs, whichever is later. For the purpose of this clause, a "monthly period" or "monthly period involved" shall mean the contractor's normal accounting month.

(3) The "Post Delivery Date" for the purpose of this clause is defined as a date eight (8) months after the contract delivery date of the applicable vessel set forth in Section H, "Deliveries or Performance".

(b) Pricing of Changes

(1) The costs subject to adjustment under this clause include the costs of performance of changes or other work for which the contract price is subject to equitable adjustment pursuant to the "Changes" clause or pursuant to other provisions of the contract. Accordingly, equitable adjustments to the contract price shall be determined on the basis of actual and/or projected direct material costs, direct labor costs and indirect costs de-escalated to price levels of the base periods identified in peragraph (d) below. The method of de-escalation shall be the same as that set forth in paragraph (e) for determining compensation adjustments and base costs.

(2) In the event and to the extent that work authorized under the "Changes" clause results or will result in costs being incurred with respect to a vessel after the monthly period commencing subsequent to the Post Delivery Date of such vessel (or, in the case of the last vessel to be delivered, the monthly period commencing subsequent to the actual delivery date if such date occurs after the Post Delivery Date), the equitable adjustment for such change shall take account of such costs at their estimated actual value(s) rather than at the base period value(s) provided for in paragraph (b) (1) above. The costs included in the aforementioned equitable adjustment(s) shall be adjusted to preclude payment of any costs reimbursed under this clause.

(c) Cost Subject to Compensation Adjustment

(1) For the purpose of this clause, the total allowable costs in the following categories shall be subject to monthly compensation adjustment:

- a Selected employee benefits
  - 1 FICA (indirect costs)
  - 2 State and Federal Workmen's Compensation (indirect costs)
  - 3 Unemployment Compensation (indirect costs)
  - 4 Disability (indirect costs)
  - 5 Federally Mandated National Health Program (indirect costs)
  - 6 Federally Mandated changes to hours of work per week or per day and changes to the payment of overtime (indirect and direct costs)

- b Selected energy costs (indirect costs)
  - 1 Electricity
  - 2 Fuel oils
    - (i) Bunker C (No. 6)
    - (ii) Diesel 260 (No. 2 by gallon and drum)
  - 3 Coke
  - 4 Coal

- c One hundred percent of the imputed cost of facilities capital (indirect costs)
- d Ninety-five percent of indirect costs other than indirect costs in (c)(1)a, b, and c above
- e One hundred percent of direct labor costs
- f One hundred percent of direct material costs

(2) Within 30 days after the end of each monthly period with respect to each individual vessel, the contractor shall submit to the Government: (i) a certified statement of the costs incurred for that vessel during that monthly period (monthly costs) and (ii) a certified statement of the total cumulative costs incurred for that vessel from the effective date of the contract to the end of that monthly period (total costs). The statement of monthly costs shall separately identify the direct material costs, the direct labor costs and the indirect costs. With respect to indirect costs, the statement of monthly costs shall state separately from all other indirect costs (i) the monthly incurred selected employee benefit costs of the type identified in paragraph (c)(1)a above, (ii) the monthly incurred selected energy costs of the type identified in paragraph (c)(1)b above, (iii) the monthlyimputed cost of facilities capital allocated to the vessel involved, and (iv) the ninety-five percent of indirect costs subject to compensation adjustment.

a The monthly selected employee benefit costs for the vessel involved shall be the product obtained by multiplying the yard-wide total selected employee benefit costs of the type identified in paragraph (c)(1)a above by the amount of total overhead dollars, excluding the imputed cost of facilities capital, allocated to each vessel for the monthly period involved and the product shall be divided by yard-wide total overhead dollars, exlcuding the imputed cost of facilities capital, for the monthly period involved. b The monthly incurred selected energy costs for the vessel involved shall be the product obtained by multiplying the yard-wide total selected energy costs of the type identified in paragraph (c)(1)b above by the amount of general overhead dollars, excluding the imputed cost of facilities capital,

allocated to each vessel for the monthly period involved and the product shall be divided by the total yard-wide general overhead dollars, excluding the imputed cost of facilities, for the monthly period involved.

(3) For the prupose of this clause:

(a) "Direct material costs", "direct labor costs", and "indirect costs" shall have the meaning set forth in Section XV of the Defense Acquisition Regulation in effect on the effective date of this contract.

b "Monthly costs" and "total costs" shall include only "incurred costs" and "allowable costs" as those terms are defined in paragraph (a)(iii) of the clause entitled "Payments" except that "incurred costs" for material shall include the full amounts of all billings received from vendors during the monthly period involved irrespective of whether the contractor has paid the full amount of such billings. Further, on this contract, the imputed cost of facilities capital shall be treated as an "incurred indirect cost".

(4) The costs identified in this paragraph (c) shall be subject to audit and inspection by the Contracting Officer in accordance with the provisions set forth in paragraph (h) of the clause entitled "Payments".

(d) Cost Indices

(1) Selected employee benefits compensation adjustments shall be based on changes in the monthly average hourly cost of these benefits. For the month involved, the average hourly cost of the benefits listed in (c)(1)a above shall be determined by dividing the total costs recorded (including adjustments made at the end of the accounting year and included in the calculations for the month of December) in the contractor's accounts for the items listed in (c)(1)a above by the total of direct and indirect labor hours charged to all product lines and to plant under construction accounts and the result shall be carried to the same number of decimal places as the index value for the base period as shown in paragraph (d)(8) below.

(2) Selected energy costs compensation adjustments shall be based on the following:

a Electricity and fuel oil compensation adjustments shall be based on changes in the average monthly unit values of those costs. Monthly unit values for electricity costs and fuel oil costs listed in (c)(1)b above shall be computed by dividing the total usage amount of each such energy cost element during that monthly period for the contractor's entire yard into the total purchase cost billed to the contractor for the total usage amount of each such energy cost element and the result shall be carried to the same number of decimal places as the index values for the base periods as shown in paragraph (d)(8) below. Average monthly unit values are the indices for computing electricity and fuel oil compensation adjustments under paragraph (e) below.

(b) Coke and coal compensation adjustments under paragraph (e) below shall be based on changes in the following wholesale price indices published monthly by the Bureau of Labor Statistics (BLS): Coke shall be based on Code 052, Coke (Foundry By-product), and coal on Code 051, Coal.

(3) Compensation adjustments under paragraph (e) below for the imputed cost of facilities capital; 95 percent of indirect costs other than indirect costs in (c)(1)a, b, and c above; and direct labor costs shall be based on changes in the "Indices of Change in Straight-Time Average Hourly Earnings for Selected Shipyards for Steel Vessel Construction and All Regions" (September 1980 = 100) (herein sometimes called the "Labor Index") furnished to the Naval Sea Systems Command by the BLS.

(4) Adjustments in compensation under paragraph (e) below for direct material costs shall be based on the changes in the "Index for Steel Vessel Contracts" (1967 = 100) (herein sometimes called the "Material Index") furnished to the Naval Sea Systems Command by the BLS.

(5) In the event that any of the specified indices for the monthly period involved are unavailable to the contractor at the close of that monthly period, compensation adjustments pursuant to this clause shall be based upon the average of monthly changes in the applicable indices for the previous four (4) months for which indices are available. The average of changes so calculated shall be added to the applicable index for the immediately preceding monthly period and the sum shall constitutue the index for the monthly period involved. When the applicable index for the monthly period involved has been made available, the compensation adjustment for that monthly period shall be recomputed on the basis of such index, and any additional payment to or repayment by the contractor required by such recomputation for that monthly period shall be reflected in any invoice(s) thereafter submitted for payment under any provision of this contract until such amount has been paid, offset or recouped in full.

(6) In the event that any of the specified indices for any base period or any monthly period differs from the index previously available for that period, the compensation adjustment for the applicalble monthly period(s) shall be recomputed on the basis of such revised index and any additional payment to or repayment by the contractor required by such recomputation for that monthly period(s) shall be reflected in any invoice(s) submitted thereafter for payment under any provision of this contract until such amount has been paid, offset or recouped in full.

(7) The contractor shall be responsible for the calculations involving the indices provided for in this paragraph, and said calculations shall be subject to verification by the Government.

(8) For the purpose of computing compensation adjustments under this clause, the following are the applicable base period index values (subject to adjustment as specified in paragraph (d)(6) above):

Description	Base Period	Index Value	
Selected employee benefits costs	1980	*	/hour
Selected energy costs:			
Electricity	Sep 1980	$.04116	/KWH
Bunker C (No. 6)	Sep 1980	$.50110	/gal.
Diesel 260 (No. 2)	Sep 1980	$.90687	/gal.
Diesel 260 (No. 2, drum)	Sep 1980	$80.44	/55gal.
Coke	Sep 1980	430.6	

Coal	Sep 1980	472.1
Cost of facilities capital; 95% of indirect costs other than indirect costs in (c)(1)a,b, and c above; and direct labor cost	Sep 1980	100.0
Direct material cost	Sep 1980	275.9

* Index value for selected employee benefit costs is determined by dividing the base year total selected employee benefit costs by the base year total labor hours (direct and indirect) charged to all product lines and to Plant Under Construction accounts.

(e) Computation of Compensation Adjustment and Base Cost

(1) For the purpose of computing compensation adjustments under this clause, the following computations shall be used for all the categories of cost specified in paragraph (c)(1).

a For each monthly period commencing prior to the Post Delivery Date of a vessel, the amount of the applicable category of cost for such vessel certified on the statement of monthly costs for that monthly period shall be multiplied by the difference between the value of the applicable index for that monthly period and the result, the compensation adjustment for the applicable category of cost, shall be expressed to the nearest dollar. The calculation is as follows:

$$\frac{\text{Current Month Index} - \text{Base Period Index}}{\text{Current Month Index}} \times \text{Current Month Cost} = \text{Compensation Adjustment}$$

b For each monthly period commencing (i) subsequent to the Post Delivery Date of a vessel and (ii) prior to the post or actual delivery date of the last vessel to be delivered under the contract (whichever date is later), the value of the applicable index for the monthly period of the Post Delivery Date of the vessel involved or the value of the applicalble index for the monthly period involved, whichever value is the lesser, shall be the value used in the computation in (e)(1)a above as the Current Month Index to calculate the compensation adjustment.

c In the event and to the extent that the contract delivery date for a vessel is subsequently extended for reasons of governmnet responsibility or excusable delay, the Post Delivery Date for such vessel shall be deemed to be extended on a day-for-day basis and if, as a result, the Post Delivery Date is extended beyond the monthly period(s) involved shall be recomputed on the basis of the value of the applicable index for the monthly period(s) involved.

d For any monthly period commencing subsequent to the post or actual delivery date of the last vessel to be delivered under the contract, whichever date is the later, there shall be no compensation adjustment.

(2) For the purpose of computing Base Cost, the following shall apply:
a For each monthly period commencing prior to the post or actual delivery date of the last vessel to be delivered under the contract, whichever date is later, the compensation adjustments computed under (e)(1) above for all

categories of cost for each vessel shall be totaled and subtracted from Total Monthly Cost for such vessel for that monthly period.

(3) No adjustment in compensation under this clause shall be made for any monthly period for any vessel in the event that the cumulative sum of the Base Costs for all vessels for all preceding monthly periods exceeds the Ceiling Price then set forth in this contract; provided, further, that in the event the Ceiling Price thereafter is increased, by modification to this contract, adjustment in compensation under this clause shall be made for each monthly period that the cumulative sum of the Base Costs for all vessels for all preceding monthly periods does not exceed such increased Ceiling Price.

(4) The amount of the adjustment in compensation for each individual vessel determined as above (plus or minus) shall be set forth separately in a Supplemental Agreement to this contract, which also shall set forth the computation upon which each adjustment in compensation is based.

(5) In the event that any amount shown in any Supplemental Agreement pursuant to subparagraph (e)(4) in respect to a vessel is a minus figure, such amount shall be deducted from any invoice(s) presented for payment under any provision of this contract until such amount has been offset or recouped in full.

(f) Payment of Compensation Adjustment. Payments of amounts of compensation adjustment under this clause shall be made for each vessel on the basis of monthly periods. Except as provided in subparagraph (f)(3) below, compensation adjustment payments shall be made provisionally on a biweekly basis as set forth in (f)(2) below and then adjusted on a monthly basis as set forth in (f)(1) below. For the purpose of this paragraph (f): a weekly period is the contractor's normal accounting week, and a biweekly pericd is two consecutive weekly periods.

(1) After execution of the Supplemental Agreement Pursuant to subparagraph (e)(4), of this clause in respect of a monthly period, and upon submission of proper invoices, the contractor shall be paid or there shall be deducted for each vessel the amount set forth in such Supplemental Agreement, less the sum of the amounts of the provisional compensation adjustments paid or payable on account of such vessel pursuant to (f)(2) below for biweekly periods, or any weeks of biweekly periods, falling in the monthly period to which the Supplemental Agreement applies. Each Supplemental Agreement shall set forth a biweekly provisional compensation adjustment amount for each vessel for the purpose of making provisional compensation adjustment payments pursuant to subparagraph (f)(2) below for biweekly periods ending after execution of such Supplemental Agreement until the next Supplemental Agreement is executed. The biweekly provisional compensation adjustment amount for each vessel shall be determined by dividing the amount of the compensation adjustment for the monthly period involved set forth in the Supplemental Agreement for each vessel by the number of weekly periods in the monthly period to which the Supplemental Agreement applies. The quotient shall then be multiplied by two and the product shall be the biweekly provisional compensation adjustment amount.

(2) At the end of every biweekly period, upon submission of proper invoices, the contractor shall be paid on account of each vessel the biweekly provisional compensation adjustment set forth in the most recently executed Supplemental Agreement.

(3) Any payment under (f)(1) or (f)(2) above shall be deferred to the extent that the amount of such payment, when added to the total of all payments previously paid or payable with respect to such vessel under this clause and the "Payments" clause (other than payments made pursuant to paragraph (g) of the "Payments" clause), would exceed the total cost limitations which are then applicable to that vessel under the terms of paragraphs (a)(1), (2), (3), and (4) of the "Payments" clause. Deferred payments of compensation adjustments shall be paid upon submission of subsequent invoices, certified by the contractor on the related invoice to have been incurred by it in performance of work on such vessel, whenever such payment, when added to the total of all payments previously made with respect to such vessel under this clause and the "Payments" clause (other than payments made pursuant to paragraph (g) of the "Payments" clause) would not exceed the total cost limitations which are then applicable to that vessel under the terms of paragraphs (a)(1), (2), (3), and (4) of the "Payments" clause of the allowable cost (as that term is defined in this clause). After the close of the monthly period during which the last delivered vessel is actually delivered, remaining deferred payments for compensation adjustment shall, upon submission of proper invoices by the contractor and upon verification thereof by the Contracting Officer, be promptly paid.

(4) The Government agrees that any request for approval to make progress payments more frequently than once every two weeks will include a request for similar approval of more frequent compensation adjustment payments. Upon approval by cognizant Government authority, this provision will be modified accordingly without additional consideration by the Contractor to the Government for such modifications.

(g) Separate Reimbursement. No adjustment shall be made in the Target Cost, Target Profit, Target Price or Ceiling Price on account of upwards or downwards adjustments in compensation made in accordance with paragraph (e) of this clause, and hence said adjustments will be paid separately and are outside the incentive price revision formula provided for in the clause hereof entitled "Incentive Price revision (Firm Target)".

(h) Disputes. Any dispute arising under this clause shall be determined in accordance with and subject to the provisions of the "Disputes" clause of the contract.

LIST OF REFERENCES

1. Assistant Secretary of the Navy Manpower Reserve Affairs and Logistics (ASN MRA L) Report, Naval Ship Procurement Process Study, p. 118, July 1978.

2. U.S. Department of Defense Office of the Assistant Secretary of Defense, Department of Defense Incentive Contracting Guide, p. 3, 1965.

3. U.S. Department of Defense, Defense Acquisition Regulation, (DAR), par. 3-404.3, 1976.

4. Surveys and Investigative Staff, Committee on Appropriations, U.S. House of Representatives (HAC SI) Report on Escalation Provisions in Shipbuilding Contracts Department of the Navy, p. 11, February 1981.

5. U.S. Department of the Navy Office of the General Counsel, Navy Contract Law, p. 569, 1959, Second Edtion.

6. Pace, D.F., Negotiation and Management of Defense Contracts, Wiley - Interscience, p. 196, 1970.

7. Gansler, J.S., The Defense Industry, p. 185, The MIT Press, 1980.

8. Comptroller General of the United States (GAO) Report PSAD-80-18, Better Navy Management of Shipbuilding Contracts Could Save Millions of Dollars, p. 34, January 10,1980.

9. Andrews, K.E., The Concept of Corporate Strategy, p. 115, Richard D. Irwin Inc., 1980, Revised Edition.

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